

Hardy Hydroelectric Plant,
Intake Tower
6928 East 36th Street
Newaygo Vicinity
Newaygo County
Michigan

HAER No. MI-100-D

HAER
MICH
68-NEWAY
ID-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
United States Department of the Interior
National Park Service
Great Lakes Systems Office
1709 Jackson Street
Omaha, Nebraska 68102-2571

HISTORIC AMERICAN ENGINEERING RECORD

HARDY HYDROELECTRIC PLANT, Intake Tower

HAER No. MI-100-D

HAER
MICH
62-NEWAYGO,
ID-

Location: 6928 East 36th Street
Newaygo Vicinity
Newaygo County
Michigan

UTM: 16:610880:4815610
Quad: Croton

Dates of
Construction: 1930-1931

Engineers: Edward M. Burd, head of civil and hydraulic engineering for
Consumers Power Company, Jackson, Michigan

Present

Owner: Consumers Energy Company (formerly Consumers Power Company),
Jackson, Michigan

Present Use: Intake structure at hydroelectric generating plant

Significance: The Intake Tower is part of the Hardy Hydroelectric Plant, built in the early 1930s as a link in Consumers Power Company's system of electric power generation. In designing and building Hardy, the company found a way to erect a stable, relatively high dam on Michigan's notoriously gravelly foundations, continuing its tradition of developing solutions to the problems presented by Michigan's geography and geology. The design process for the dam also appears to reflect a tendency in American civil engineering to favor regional practices over technology developed elsewhere. The architectural treatment of the Intake Tower and other structures at the plant reflect the company's pride in its accomplishment.

Project

Information: This documentation was prepared by Consumers Power Company (CPCo) in conformance with its Cultural Resources Management Plan for the Muskegon River Hydroelectric Projects (July 1995). The plan stipulated the recordation of the entire Hardy Hydroelectric Plant (according to the standards of the Historic American Engineering Record). The documentation was completed in 1997 by Hess, Roise and Company of Minneapolis under contract with CPCo. Cynthia de Miranda served as Project Historian under the supervision of Principal Investigator Jeffrey A. Hess. Project photography was completed under a subcontract with Hess Roise by Clayton B. Fraser of Loveland, Colorado.

PHYSICAL DESCRIPTION

The intake structure for the Hardy Hydroelectric Plant (HAER No. MI-100) is a tower that rises above the pond about 96' from the centerline of the Embankment (HAER No. MI-100-A). The tower's reinforced-concrete substructure, which extends through the dam's upstream slope to the bed of the Muskegon River, has two intake levels. The lower intake comprises three unlined concrete conduits that run from a crib intake at the upstream toe of the dam to the base of the tower. The upper intake is located in the upstream (north) foundation wall of the tower, about 23' below the pond's headwater elevation. The intakes are protected by drift catchers and trash racks, respectively.¹

The tower's superstructure is a steel-framed single-story gatehouse measuring 30'-6" x 55'-8". Clad in yellow brick, the structure displays the same Spanish Colonial Revival detailing as the Powerhouse (HAER No. MI-100-B): hipped roof sheathed in green clay tile; arcaded cornice; and oversized round-headed fenestration embellished with orange-brick surrounds and yellow-brick hoods. Two arched windows allow light to enter on the tower's east and west facades, while three similar windows are cut into each of the upstream (north) and downstream (south) facades. Industrial steel sash fills all the windows. Access is from the east facade: a single-leaf personnel door occupies the lower portion of the north window. A trolley beam, used to hoist equipment to the superstructure during construction, runs the width of the building on its upstream (north) side. The beam curves around the building's northeast corner, entering the gatehouse through the upper portion of the east facade's north window.

The Intake Tower shelters three service gates and three emergency gates for the penstock tubes. All gates have their own 20-ton hoisting chains and are suspended just above the penstock tubes in the substructure of the tower.

A two-span steel plate-girder pedestrian bridge links the east side of the tower to the roadway across the dam's crest. Pipe rails top the girders to form hand railings. The bridge connects with a cantilevered, reinforced-concrete walkway that extends from the tower's east side. A solid concrete rail with three recessed panels and concrete endposts rims the east side of the walk.

¹ All directions are given in full cardinal points for the sake of clarity. This description is based on the 24 July 1995 site survey conducted by the authors and on documentation prepared by Consumers Power Company. See "Hardy Dam," 1933 summary of plant's features, historical files, Civil/Mechanical Engineering Projects, Engineering and Construction, Consumers Power Company, Parnall Road, Jackson, Michigan; Consumers Power Company, "Plans, Elevations, and Section—Intake Tower," Drawing No. M-164-F1247, and "Intake Tower Approach Bridge Pier and Abutment Details, Hardy Dam," Drawing No. M-164-F1273, Bridge Street file storage, Consumers Power Company, Jackson, Michigan; and "General Plan and Section of Dam and Powerplant, Hardy Plant, Muskegon River, Figure No. 10," Hydro Operations, Consumers Power Company, Cadillac, Michigan.

HISTORY

The Hardy Hydroelectric Plant (HAER No. M1-100) was built in the early 1930s as a link in Consumers Power Company's (CPCo) system of hydroelectric power generation. Generally, CPCo built utilitarian structures at its plants: buildings with only modest embellishments or subtle allusions to architectural styles. The well-articulated Spanish Colonial Revival style employed at Hardy was a dramatic departure from that norm and illustrates the company's view of the plant as a showpiece in its system. In addition to its hydraulic function, the Intake Tower, as the plant's most visible element, serves as Hardy's emblem.

Edward M. Burd, CPCo's head of civil and hydraulic engineering, presented an initial design for the proposed plant in 1926. Burd's plan departed from CPCo's standard in part because it separated the intake structure from the powerhouse, a layout the company had never before employed. Other CPCo plants used a combined powerhouse and intake, joining an open penstock block—essentially a large concrete room with gates at the top of the upstream wall controlling the flow of water to the turbines—to the upstream side of the powerhouse. In horizontally connected plants, the turbines sat inside the block, while vertically connected plants had scroll cases that directed water from the open penstock to the turbines. The height of the penstock block was determined by the plant's head.²

The 100' head proposed for Hardy challenged that design. "The open penstock type of construction at other plants reached its limit when extended and adapted to the 70 foot head at Hodenpyl," Burd wrote of the plant the company had built on the Manistee River that year. Burd's solution, articulated in his 1926 plan, placed the Intake Tower in the upstream slope of the dam and the Powerhouse on the embankment's downstream toe. Three 14'-0" diameter penstock tubes built through the embankment connected the two buildings. "The separation of intake and powerhouse by buried penstocks . . ." Burd explained, ". . . lessens and spreads out the loading and greatly simplifies design and construction."³

Architecturally, however, the structures in Burd's 1926 plan did not represent a departure from the company's traditional methods. Rather, they followed the utilitarian precedent set by other developments in the company's system. Burd's initial design called for a very subdued version of the Jacobethan Revival style used at other CPCo plants on the Au Sable River.⁴

² W.W. Tefft, "System and Operating Methods of Consumers Power Co.," *Power* 55 (4 April 1922): 526-529.

³ Edward M. Burd, "Location and Design of Hardy Hydro Plant," *Au Sable News* 17 (August 1931), 4.

⁴ Burd, "Oxbow Prospectus," 12 December 1926, historical files, Hydro Operations, Consumers Power Company, Cadillac, Michigan; Commonwealth Cultural Resources Group, "Hydroelectric Plant Historical Review" (prepared for Consumers Power Company, Jackson, Michigan, April 1991), 16,23.

Debates over the design of the dam held up the plant's construction for two years. In the meantime, CPCo recognized that the relatively large dam it was about to build could spur considerable publicity and possibly encourage investment in the company. The enhanced architectural treatment of structures at Hardy reflects that view.⁵

Excavation for the Intake Tower began early in 1930; by February, crews had set forms for the substructure and for the lower intake conduits. Concreting continued throughout the year. Workmen finished the foundation and the steel framing for the superstructure by early December, when they began to lay the brick walls. Fill for the Embankment (HAER No. MI-100-A) was at the same time delivered to the site and sluiced into place.⁶

Brickwork on the Intake Tower was complete by January 1931, when industrial steel sash was installed in the round-arched windows of the superstructure. Concrete work for the connecting bridge substructure was also underway. The green clay roof tiles were placed before spring.

The Intake Tower has not seen any major changes in appearance or use since it went into operation in 1931.

⁵ The overview portion of this documentation, HAER No. MI-100, "Hardy Hydroelectric Plant," outlines the nature of the engineering disputes.

⁶ The construction account is based on photographs taken during erection of the dam and power plant. The collection belongs to Consumers Power Company and is maintained at the site.

SOURCES OF INFORMATION

ENGINEERING DRAWINGS

Consumers Power Company. "Intake Tower Approach Bridge Pier and Abutment Details, Hardy Dam." Bridge Street file storage, Consumers Power Company, Jackson, Michigan.

_____. "Plans, Elevations, and Section--Intake Tower." Drawing No. M-164-F1247. Bridge Street file storage, Consumers Power Company, Jackson, Michigan.

"General Plan and Section of Dam and Powerplant, Hardy Plant, Muskegon River, Figure No. 10." Hydro Operations, Consumers Power Company, Cadillac, Michigan.

HISTORIC VIEWS

Hardy Hydroelectric Plant Construction Photographs. Consumers Powers Company, Hardy Hydroelectric Plant, Muskegon River, Michigan.

PUBLISHED SOURCES

Burd, Edward M. "Location and Design of Hardy Hydro Plant." *Au Sable News* 17 (August 1931) 3-6, 28-31.

Creager, William and Joel Justin. *Hydro-electric Handbook*. New York: John Wiley and Sons, 1927.

Gaylord, J.M. and J.L. Savage. *High-pressure Reservoir Outlets: A Report on Bureau of Reclamation Installations*. Washington: Government Printing Office, 1923.

Tefft, W.W. "System and Operating Methods of Consumers Power Co." *Power* 55 (4 April 1922): 526-530.

ARCHIVAL COLLECTIONS

Historical files, Civil/Mechanical Engineering Projects, Engineering and Construction, Consumers Power Company, Parnall Road, Jackson, Michigan.